

NOTES MALNUTRITION

GENERALLY, WHAT IS IT?

PATHOLOGY & CAUSES

- Supply/demand imbalance of nutrients, energy required for growth, maintenance, function
- Disease spectrum
 - **Kwashiorkor**: inadequate protein intake with adequate total caloric intake
 - **Marasmus**: inadequate protein, caloric intake
- Malnutrition impairs immune function → ↑ infection likelihood → ↑ nutritional demand → further malnutrition
 - Malnutrition → atrophy of lymph glands, tonsils, thymus → impaired cellular immunity, delayed hypersensitivity loss
 - Protein insufficiency → ↓ immunoglobulins, ↓ complement → impaired phagocytosis
 - Acute-phase immune response loss → typical infection signs loss (leukocytosis, fever)
- Refeeding syndrome
 - **Metabolic disturbance**: excessively-rapid nutrition reintroduction to severely malnourished individual
 - Rapid nutrient reintroduction → glycogen, fat, protein synthesis → serum potassium, magnesium, phosphorus consumption → mineral imbalance → cardiac, pulmonary, neurological sequelae (cardiac arrhythmias, cardiac failure, confusion, convulsions, coma)

SIGNS & SYMPTOMS

- Kwashiorkor
 - Bilateral pitting edema, distended abdomen, hair thinning, skin/hair depigmentation, dermatitis

- Marasmus
 - Emaciated appearance (“wizened” facies), severe muscle wasting, subcutaneous-fat loss

DIAGNOSIS

DIAGNOSTIC IMAGING

Chest X-ray

- *Infection workup*: respiratory distress

LAB RESULTS

- Hypoglycemia
- Anemia (normochromic-normocytic or hypochromic-microcytic/macrocyclic)
- Electrolyte levels (calcium, phosphate, magnesium, serum albumin, urea) → various deficiencies

Infection workup

- Blood culture
- Common endemic infection tests (e.g. HIV, malaria, parasites)

OTHER DIAGNOSTICS

Anthropometry

- Body weight < 62.36% expected body weight for age
- Weight-for-height Z-score < -3 standard deviations → severe wasting
- Mean upper-arm circumference < 11.5cm/4.53in → severe wasting

VISIT...

LANZAROTE
Caliente.COM

TREATMENT

World Health Organisation (WHO) 10 steps for severe malnutrition management

- Treat/prevent hypoglycemia (blood glucose < 3mmol/L)
 - **Prevention:** urgent small frequent feeds
 - **Treatment:** dextrose water
- Treat/prevent hypothermia (rectal/oral temperature < 35.5°C/95.9°F)
- Treat/prevent dehydration
 - **Prevention:** oral rehydration (sunken eyes, no urine passed for 12 hours, thirst)
 - **Treatment:** intravenous fluid infusion (lethargy/consciousness loss)
- Correct electrolyte imbalances
 - Total-body sodium excess (likely in severe malnourishment) avoid high sodium solutions, feeds
 - Specialized refeeding milk feeds contain necessary electrolytes
- Treat infection
 - Broad-spectrum antibiotics
 - *In endemic regions:* children < one year of age, assume presence of parasitic infection → mebendazole
- Correct micronutrient deficiencies
 - **Supplements:** multivitamin, vitamin A, potassium, magnesium, iron, folic acid, zinc, copper
- Start cautious feeding
 - WHO recommended starter formula “F-75”
- Achieve catch-up growth
 - WHO recommended catch-up formula “F-100”
 - Reintroduce normal meals
- Provide sensory stimulation, emotional support
- Prepare for discharge, post-recovery follow-up

KWASHIORKOR

osms.it/kwashiorkor

PATHOLOGY & CAUSES

- Sufficient calorie intake, severely **inadequate protein intake**
- AKA “the sickness the baby gets when the new baby comes”
 - Older children in food-scarce environments weaned off breast milk → carbohydrate rich diet
- Characterization
 - Inadequate adaptation; insufficient dietary nutrient intake
 - Extreme protein deficiency → ↓ liver protein synthesis → osmotic imbalance → edema, abdominal distension
 - ↓ lymphatic function → ↓ fluid recovery, low lipid absorption → further abdominal distension

SIGNS & SYMPTOMS

- Bilateral pitting **edema**, distended abdomen (rarely ascites; typically weak abdominal musculature, hepatomegaly)
- Hepatomegaly (with fatty infiltration)
- Muscle wasting
- Integumentary change (thinning hair, skin/hair depigmentation, dermatitis)
- Irritability, listless affect

DIAGNOSIS

DIAGNOSTIC IMAGING

Chest X-ray

- *Infection workup:* respiratory distress

LAB RESULTS

- Hypoglycemia
- ↓ blood lipids
- Hypoalbuminemia, hypoproteinemia (transferrin, essential amino acids, lipoprotein)
- Anemia (normochromic-normocytic/hypochromic microcytic/macrocytic)
- Electrolyte depletion → hypocalcemia, hypophosphatemia, hypomagnesemia, hypokalemia

Infection workup

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TREATMENT

MEDICATIONS

- Prophylactic antibiotics
 - Malnutrition-induced immunodeficiency compensation

OTHER INTERVENTIONS

- Correct glycemic, electrolyte, hydration abnormalities
- Protein refeeding, gradually ↑ protein amount
 - Excessively-rapid protein refeeding → protein catabolism → urea accumulation → may overwhelm already-impaired liver → liver failure

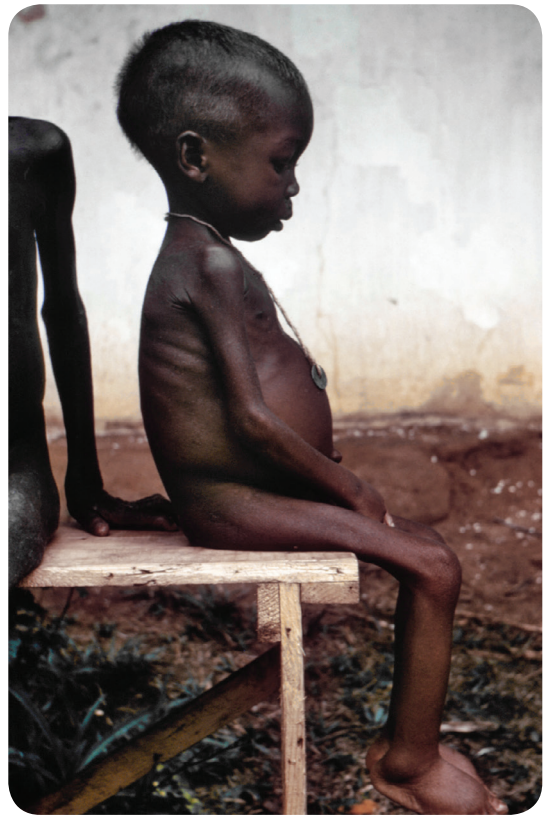


Figure 47.1 A child with kwashiorkor.

MARASMUS

osms.it/marasmus

PATHOLOGY & CAUSES

- Severe **malnutrition**: **inadequate calorie/protein** intake
- Insufficient energy balance → evolving adaptation
 - ↓ intake, ↑ loss (e.g. emesis, diarrhea, burns), ↑ energy expenditure → negative energy balance
 - **Negative energy balance adaptations**: ↓ physical activity, lethargy, ↓ basal metabolic rate, growth retardation, weight loss

SIGNS & SYMPTOMS

- Emaciated appearance (“wizened” facial appearance), head (compared to body) appears disproportionately large
- Severe **muscle wasting** → redundant skin folds
- Subcutaneous fat loss
- Irritability, weakness, lethargy

DIAGNOSIS

DIAGNOSTIC IMAGING

Chest X-ray

- **Infection workup**: respiratory distress

LAB RESULTS

- Hypotension
- Hypothermia
- Hypoglycemia
- Anemia (normochromic-normocytic/hypochromic microcytic/macrocytic)
- Hyponatremia +/- non-specific electrolyte imbalances

Infection workup

- Blood culture
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